AMERICAN JOURNAL OF OPTOMETRY

VOL. 8 JULY, 1931 NO. 7

COLOR FIELD WORK*

M. M. Ocshier, Opt. D.
West Springfield, Pa.

In presenting this paper[1], I must confess that I find this all absorbing subject extremely deep and baffling and as yet little understood. Many have done a great deal of research work along the line of color field work and have given us some worthwhile information but only few in the United States have become masters of this diagnostic technique and even they make statements and advance theories of which they are by no means certain.

There are but three ways of acquiring knowledge in life, viz.: by being taught by others, by experience and observation and by research. Our great teachers are melting pots for all these methods of learning.

In trying to impart information on any subject we must naturally draw upon these sources and quote many authorities. And we find the works of these same authorities are, to a great extent, compilations of the teachings of others, with a sprinkling of their own research and observation.

From a psychological and therapeutical standpoint, colors and color effects have for many years been of great interest to the writer and with your permission to slightly digress from the original subject I will mention this phase of thought later on which I shall call effectivity of color influence, but will not offer a treatise. In a recent article by Dr. W. C. Wideman of Chicago, he says that light sensations are probably the most important of the many kinds of impressions that man receives from his surroundings. Color vision has been and still is to some extent more or less a conundrum. So far, we have a number of finely spun theories, some more plausible than others.

*Submitted for publication April 20, 1931.
[1]Read before the New York and Pennsylvania Academy of Optometry.

The Newton theory at best was but a crude attempt to account for facts and was promptly discarded by those who really began to make a study of color vision.

Even the latest theory by Ladd-Franklin, which has now been adopted by writers of text books and a large number of physiologists is being subjected to criticism. The Young-Hemholtz theory, really first promoted by Thomas Young and later advanced by Clark Maxwell, and especially by Helmholtz, was based on the fact that red, green and blue of the proper shades combined in the right proportions, produced a colorless sensation on the color wheel.

This color combination does not produce an absolute white but it produces a very light gray and a nearer approach to a colorless sensation than a combination of the Newton colors, viz.: violet, indigo, blue, green, yellow, orange and red. The Ladd-Franklin theory assumes that there exists in the receptors a chemical substance which reacts in the primitive state to light and arouses merely a sensation of white gray and black depending on intensity of the light; this is called principally what is known as twilight or peripheral vision, or, as is sometimes termed rod vision, because the peripheral portion of the retina contains, virtually, nothing but rods. The rods, it is believed, are the only receptors sensitive to light without color, and as the center of the retina is composed virtually of cones it is quite naturally assumed that the rods are the receptors for white light and the cones the receptors for the highest form of color achieved to the present, viz.: red and green. As the intermediate area of the retina is composed of both rods and cones this section of it is supposed to constitute the second stage of evolution.

In the course of evolution the "mother substance," a photographic substance found in the rods and cones, is decomposed and gives off cleavage products which arouses the activity that starts nerve currents coursing toward the brain.

Peripheral or marginal vision is virtually rod vision; the rods increase toward margin and the cones toward the center. Schoen published the first work on visual fields in 1874. Quoting from "Visual Field Studies" by Lloyd, "We have long used alterations of the ability of the central areas to detect color as an index of visual acuity but a central color defect is proof of poor detail vision; yet, we can have poor detail vision and very moderate alteration of color sense. This reaction of the twin faculties in the periphery is much closer than that of the two resident in the central areas and, for all purposes now known, tests conducted with various sizes of disks (moving disks) are satisfactory. Color sense is mostly a central function. Recognition of most colors like green or red, as it is moving from the outer limits toward the center, is not, at first, true color recognition. Green will be colorless at first, then white before it takes on a really green tint. Red is first colorless, then a sort of terra cotta tinge followed by yellow before it appears as red. Blue is first colorless, then a sort of

gray, then blue. Blue color blindness is rare and when found will be due to some pathological condition."

Although the blind spot was discovered in 1668, the first useful application of blind spot details was made by Coccins who demonstrated the effect of glaucoma in 1859. He thought the swollen nerve had pressed upon the retina. Von Graefe recognized blind spots before 1856 as signs of disease. Cantonnet, in 1903, studied it in myopia and Van Derhoeve, in 1909, gave us the relation of sinus disease to enlarged spots. The location of the blind spot is altered somewhat by refractive conditions. Lloyd says that the blind spot can be used to measure the deviation of a squinting eye. Indications for field study are found in any case that cannot read 20/20 with correction, and for which no explanation can be found in the cornea, lens, or vitreous. Changes peculiar to colors and contraction of the form fields shows the degree of disease of the visual tract. It is better evidence of the real condition of the visual path than an ophthalmoscopic examination or study can possibly furnish. The color field and color changes, however, furnish a more delicate test in the early stages of the disease and at times furnish the clue to the seat of the trouble before appreciable change has taken place in the form field.

Color changes in general are earlier than those for form, and a careful study of the behavior of colors in the various parts of the field has increased the clinical value of perimetry both in diagnosis and prognosis. Studies in color fields show that blue is more clearly observed in indirect vision than in the macula. A red object 2 m/m in diameter can be clearly defined in a good light at 6 meters. A 5 m/m green object may be seen at the same distance but few people can recognize a blue object 7 m/m at this distance. However, when a 7 m/m blue object is placed 15 C. M. eccentric to the point of fixation, it can easily be recognized as blue at 6 M. Dr. Peter says, "Under certain conditions, often functional in type, the order of the size of color fields is reversed."

In retro-Bulbar disease, general characteristics of field effects of nerve, chiasm, and cerebral lesions. These are characterized by defects that first concern the long wave section of the spectrum, red and green. Green is first affected, then red and finally blue. It is not to be assumed that a grave defect for green and red can exist without some effect upon the visual acuity or the field for white. The normal field in an upward direction is 50 degrees, downward 70 degrees, a total of 120 degrees in vertical plane. Inward 60 degrees, outward 90 degrees, a total of 150 degrees in horizontal plane. The largest field is for white, blue nearly the same, then yellow, red, and green in order given, each about 10% less in all directions than the previous one.

There are cases of high astigmia, myopia or hyperopia which will not have normal vision even with correction. The ophthalmometer may show irregular astigmatism and another common cause of defective vision in these cases is the non-alignment of the axis of the

lens and the axis of the cornea (Dr. Tschering). Scotoma is usually defined as an insular defect in the visual field. A central scotoma may be defined or referred to as a defect of the macular area because detail vision is exclusively the function of the central 15 degrees to 20 degrees; that is from 7 degrees to 10 degrees each way from the fixation point. A negative scotoma is a field defect in the area of which the patient is not conscious of a cloud or mist or black spot or what not which prevents impressions.

Color perimetry according to Lloyd: "If colors are to be used to provide a graduated series of test objects of the single color or if a series of colors are to be used, the perimeter must be given the neutral color which harmonizes with the brightness of the colors used when observed with the peripheral retina."

Peripheral similarity is desirable and is best supplied by a gray tone. The illumination must receive particular attention if the results are to be of value. The colors used must be invariable to avoid the perplexing question of the moment when the test color takes on true color.

Among the different functions of the perimeter are, according to various authorities, the location of foreign bodies, now obsolete as the X-ray is so much better for that work, the estimation of strabismus, in detecting various diseases and diseases of the eye and its appendages; glaucoma, optic nerve atrophy, syphilitic, sinus diseases, arterio sclerosis and many other conditions can be detected and estimated from the scotomas revealed by the perimeter. Optic tract lesions, the causes of which are gross lesion at the base of skull, syphilis, tumor, diabetes, vascular diseases and multiple sclerosis. Perimetrically the symptoms of retinitis pigmentosa are, first, a progressive and rapid contract of the form field, sometimes irregular, but usually concentric; second, preservation of central vision for form and color long after peripheral vision has been lost; third, ring scotoma in the earliest stages of disease; fourth, the absence of central defects until the progressive loss of the form field encroaches upon central vision. Most of those who have made careful study of the condition agree that progressive contraction of the form field is the earliest and most characteristic perimetric finding. Kollnes claims the broad ring scotoma is the earliest perimetric finding. Dr. Swanzy speaks of central scotoma in toxic amblyopia. Refractive errors also affect the field, myopia diminishing and hyperopia increasing the field. Influencing drugs: Strychnia is a well known nerve stimulant; it increases reflexes and nerve activities throughout the body. In the periphery of the retina there is a zone in which because of little use and few in number, they require strong stimulation in order to obtain definite impressions. Strychnia acts as a sensitizer to this zone as well as to all functioning parts of the retina, and consequently increases the size of the field temporarily. In contrast to the stimulation by strychnia is the sedative influence of normal fatigue not the

result of neurasthenia. Examination should be made when patient's mental and physical condition is good and not at the end of a prolonged eye examination. If patient is examined when suffering from mental or physical fatigue, the fields attained will show a contraction which is abnormal for that patient. So, in perimetry it is better to take the field findings before the regular eye examination or, better still, have a special sitting for it. A case in point: A short time ago I had a patient, a man of 23 who works outside all day but has some clerical work to do evenings. He came to me for refraction and during the course of examination, I mistrusted a toxic condition as his eyes, especially the right one, did not react to lens action as it should have done and as he said that he did not smoke much but smelled rather strong of nicotine, I began to quiz him. He admitted buying cigarettes by the carton and only smoked a package a day and sometimes a cigar but kept a pipe and a tin of tobacco handy to fill in with. The right eye had the regular symptoms of myopia except that it did not respond readily to minus lenses so I tried the perimeter but did not get very far, due to the fact of fatigue, but got far enough to find that his field for white was about normal, then had to give it up. I then proceeded to examine his old glasses which he said he had been wearing about two years mostly for reading and found them to be OU. minus .75 Sph. My prescription was L. D. plus .25 x 180 O. S. plus .75 C. x 180 which gave him immediate relief for near vision. This gave him 20/25 vision for distance. While the work with the perimeter was extremely limited I am satisfied that he has no scotoma of any amount. Owing to the delicacy of the question I did not ask him if he used liquid refreshments in conjunction with his tobacco.

Tobacco and alcohol amblyopia does not necessarily affect both eyes alike. In the case of toxic amblyopia, the good eye may be 20/40 or 20/30 while the poor eye may be only 20/140 or even less. Alcohol and tobacco cases are slower in development than syphilitic types. Wood alcohol cases develop very rapidly and do not improve like other cases. Tobacco is a milder form of poisoning of the optic nerve. Injections of arsenic and mercury for syphilis do not produce a pure nerve involvement but the choroid, retina and iris are involved.

As a rule any scotoma which becomes a defect for white at the fixing point for one or two degrees does not improve; the peripheral fields are of good size in nearly all of such cases and cases can be found with very poor vision but the field is within 5 or 10 degrees of normal. Dr. Lloyd says the perimeter is not the instrument to use in these cases, that is to examine such cases, for if so used will pass over huge central defects. The campimeter is the instrument to use in such cases.

Alcohol poisoning of today and that of pre-Volstead days are two different things; the modern scotoma is more rapid in development and leaves more permanent danger to central vision. Mendelsohn says "Lateral muscular imbalance (esophoria and exophoria) will

usually show a depression of the vertical meridians of the color field limits, which enlarge to normal after training has eliminated the imbalance. (I presume he expects it to be done with myoculator.) When the limits of all the color fields appear constricted, vertical imbalances are often present." He further says that involvements of the green field limits can in most cases be traced to so-called "focal infection."

Any point of infection from which pus is exuding or toxins being absorbed into the general system will first register its presence by a marked contraction of the green field. Contraction of the red field is present in cases of general systemic toxemia.

All cases of muscular imbalance or lower convergence, etc., where the green or red fields are involved are usually due to the toxic element, and as such, the toxemia should be removed before any attempt is made to correct the muscle deficiency or permanency of correction will be lacking. Most cases showing such field contraction will show a high leukocyte count, if made, which is a further indication of systemic toxemia.

The possibilities of color field work is almost unlimited for the purpose of diagnosis and while the perimeter has been in use since 1847 and has been the method most generally used up to the present I believe that the myoculator will eventually take its place to a great extent at least.

Effectivity of Color Influence

Specific colors do not influence all persons alike but all persons whom are not totally color blind, which is rare, indeed, are influenced by color. Different colors having different effects on the same person and the same colors different effects upon different persons.

Blue is a color which practically everyone sees as blue and most people like blue, at least, in some of its hues. But confine a person in a room completely decorated and furnished in blue and that person would soon go insane. Other colors will affect the same patient differently. Red is stimulating while yellow and green are sedative in effect. Gray is a combination of different colors with the brighter pigments subdued and, therefore, strikes a happy medium which is neither stimulating nor depressing.

My theory of color influence is that it awakens certain sensations in the subconscious mind, thereby causing a chemical change in the visual purple or mother substance creating active vibrations that travel over the sensory nerve fibers with its greatest force centering between the third and fourth ventricles. I have not, as yet found anything authoritative on the subject but hope the future will develop a working knowledge of color and effect. I firmly believe that when this subject is well understood that not only will it be a means of diagnosis but will supply the remedy as well for most nervous and mental diseases. This may, however, also involve the use of psycho-

analysis, for color effect may be due to certain associations long in the past and may be pleasing or depressing according to the circumstances under which the impression was made.

To those present my statements may seem radical and far-fetched but to prove that it contains certain physiological and psychological truths all one needs do is. to observe his own personal experiences from day to day. For instance, if on entering a place you have the feeling that you would not like to linger but instead would like to get out, a feeling for which you cannot account, just take a look around at the decorations and color scheme and there you will usually find the answer. The same will be true when you experience a feeling diametrically opposite that is as though you would like to linger in perfect contentment; just look around and you will see why. These conditions may be due to wrong colors or a lack of harmony in the colors.

Now the next question is, "Do we give proper consideration to the decoration of our offices and reception rooms?" And don't forget the reception room. Your decorations may be of the costliest yet keep patients away, or again, they might be of the most economical and yet so chosen and so blended that they will bring patients back. I always said that about the worst thing a refractionist could do was to clutter up his place with white equipment, a practice much in vogue a few years ago but (and sensibly) is much less in evidence at the present time. I have recently contemplated abandoning the white office coat for one of a more suitable color. For hospitals and surgical rooms white is very appropriate, for it is indicative of cleanliness, but disastrous where reflected light means so much as it does in retraction. Grays and certain shades of tans and browns as well as certain shades of green are the best for a refractionist's office but in all events there must be harmony. Inharmonious color schemes can upset the nervous equilibrium without that person having the remotest idea of the cause. Nature blends her colors so perfectly that one never tires of viewing them no matter whether it be the greens of spring or the multitudinous blend of autumn, none of which any artist can duplicate. Perimetry is coming into its own by awakening an interest in color field work. This field study is vast and deep and involves so much that it means a lifetime study to achieve much in that line. Few have gained distinction in this work; true, a number have made much progress but a mere handful, perhaps a dozen men in the U. S., have distinguished themselves, but we feel that any part of the subject is sufficient to awaken interest in the young optometrists to put forth an effort to master a science which means so much to optometry and to humanity.

DR. M. M. OCSHIER,
WEST SPRINGFIELD, PA.

SYSTEMATIC CASE ANALYSIS*

Carl W. Sheppard, Opt. D., and W. A. Mendelsohn, Opt. D.
The Post-Graduate Eye Institute
Chicago, Ill.

It seems to be a universal optometric desire to find some means or method by which the diagnosis of any case may be arrived at automatically. Every new mechanical device provided with calibrated scales from which the lens prescription may be read directly, receives wide spread attention. Every new system of rules for the interpretation of the examination findings is welcomed on every hand. But it is highly improbable that any mechanical device or system of formulas will ever even remotely approach the efficiency of experienced intelligence in analyzing any human condition. Rules that apply to the majority of cases are arrived at with comparative ease and are certainly worthy of the consideration of every optometrist; but the outstanding, successful optometrist is, and probably will remain, the fellow who somehow knows when to break a rule, or to go contrary to rules that apply to the "average case."

With the advancement of optometric knowledge and the accumulation of collective experience, have come many new tests, and many new versions and elaborations of old methods. Sometimes new methods have replaced previous methods justly, but unfortunately, sometimes old but understood methods have been pushed into nonuse by new, not understood methods which have been adopted by the individual simply because they have become "popular" and the individual is deadly in fear of being considered a back number by his contemporaries.

No old method should be abandoned until it can be replaced by an assuredly better method equally well understood.

The most familiar question to every optometric educator is: "What does it mean after you find it?" And it is often a most difficult question to answer because *no one optometric finding means anything.*

To arrive at an intelligent conclusion in the diagnosis of any case it is necessary for the optometrist to consider, deliberately or unconsciously, each factor and all factors involved. These factors will include, probably, the results of some observations made un-

*An abridgment of the material presented in the Associate Monthly Report of the Post-Graduate Eye Institute, No. 4, 1931.

consciously or automatically, if the optometrist be thoroughly trained in the school of experience. However, the art of correct diagnosis reaches its highest development in the person of the optometrist who systematizes his procedure and organizes his thinking to the end that he leaves as little as possible to chance and intuition. Therefore, as an aid to systematic investigation and organized thinking, certain systems of case analysis and diagnosis by formula are commendable, and well worthy of the studious attention of the optometrist who wishes to learn all that he can from experience.

The development of any system for arriving at even a tentative diagnosis or case classification should begin with the adoption of a reasonable, but complete routine examination. Hardly two optometrists will be perfectly satisfied with any one routine procedure, therefore each optometrist should arrange his own; but each such routine should conform in the main with the procedure of other optometrists and, above all, be sufficiently complete to include investigation of every principal function involved in the rather complicated process of seeing.

The day is long past when an optometric examination includes no more than a determination of the manifest error of the moment, but the fact remains that (to be conservative) seventy-five per cent of optometric patients are more or less simple refractive cases. We must recognize, correctly classify, and properly serve the twenty-five per cent if we are to realize success; but, in so doing we must not impose upon the time, patience or purse of the seventy-five per cent, for financial disaster lurks in that direction. Therefore, our routine examination must be not only complete, but concise and as brief as it is possible to make it; and each successive step must be carefully selected, skillfully executed, and thoroughly understood.

The list in the outline accompanying this article will serve as a guide, and to illustrate systematic diagnosis; and will be found to satisfy requirements quite well, but it of course, admits of many modifications.

The next step in the development of a diagnostic system is to so record the findings at each step in the examination that these findings may be intelligently considered as factors in the final analysis. To this end it will be found necessary to make at least two, and better three, distinctive sorts of notations or records of the examination.

The first sort of notation is that of which there is neither question nor doubt. For example, if the patient speaks and reads intelligently, and unhesitatingly pronounces correctly the test letters in the normal line but cannot distinguish the letters in the next smaller line, the notation of visual acuity is definitely "20/20" (or an equivalent symbol); and the record should be so marked that the accuracy of this finding is immediately recognizable. Such notations may be made in black, or without distinguishing feature because they are the

hoped for and most commonly recorded notations.

The second sort of notation is that of which there is some doubt, or which for any reason should be rechecked at some future time. For example, suppose the patient be illiterate and there be some doubt as to the exact visual acuity; or suppose that it seems to vary slightly from moment to moment, but seems to be approximately "20/20." This sort of notation should be distinguished by a question mark: "20/20"? or better yet, by the use of a green pencil instead of black in marking the record.

The third sort of notation is that which for any reason carries an exceptional significance, especially if it suggests an imperative need of immediate attention. For example, a definitely pathologic symptom should be emphasized to prevent any possibility of oversight. Such notations may be underlined; but, because of the element of danger involved, it is most appropriate to record such notations in red.

After the examination is complete, the findings, point by point, are compared to, or copied upon a form such as the outline accompanying this article. This outline should require no elaborate explanation.

In the first column are listed the tests employed in the complete examination and approximately in the order of their use. In the second column, opposite each test will be found the normal findings; and in the third column instructions for notations to be made according to the departures from normal discovered.

These notations are made after the words "refer," "treatment" and "lenses," as indicated by the initials R, T, and L. For example, a recent case gives the following: R???, Txxxxx, Lxxxxxx. No definite "R" indication and only three doubtful indications of possible reasons for referring the case, leaves it an assured optometric case. Ten indications of the need for optometric treatment, and six indications of lenses needed, show the necessity for both services.

The comparison of the three totals provides a surprisingly clear picture of the patient's requirements; a picture that may not be necessary in many cases, but one that will be of inestimable value in the consideration of doubtful cases.

After it is determined that optometric treatment is definitely indicated by the total "T" indications, a further analysis of the case may be had by reconsideration of the findings indicating treatment: and the same may be said of each of the other classifications; but so various are the individual assemblies of the human mechanism, that attempts to carry the application of formulas and rules to extremes usually result in confusion and error. However, the analysis presented here can undoubtedly be carried much farther with good results.

Many optometrists will prefer to entirely eliminate one or two of the tests given here, or to substitute alternate tests; and many will prefer to leave such tests as colorfields, transillumination, and duction tests (all but abduction) out of the preliminary examination routine, including them only when a sufficient number of the "R" and "T" indications demand further investigation. But one may not eliminate very many of the tests without destroying the value of the entire system.

Finally, it must not be assumed that treatment is urged, or the patient immediately referred on the strength of one or two of the "T" and "R" indications. If we apply in the analysis the suggestion made in reference to the actual case record, and employ a definite check (x) where indications are positive, and a question mark (?) when the indications are doubtful, one of the former will influence our judgment more than several of the latter; and a further advantage will be gained in that an opening will be left for the entry of the most valuable factor in the entire "system," namely, ordinary intelligence and sound judgment.

F. L. Age 35 (whose analysis is cited as an example) complained of excessive lachrymation and inflamed eyes. No positive and only three questionable indications for referring the case. Ten definite indications of optometric treatment. Six definite indications of new lenses needed.

History of case: First optometrist refracted and gave lenses (an under correction as afterward indicated), but had no facilities for or interest in optometric treatment. When patient returned was referred to M. D. and received some medical treatment without benefit. Second optometrist gave optometric treatment and more than doubled plus sphere in lens prescription. Optometric treatment continued, lachrymation and redness gradually subsided.

TEST	NORMAL	INDICATIONS
Identification of patient and age		
Present complaints	None	Eyestrain symptoms, check T and L. Pathologic symptoms, check R.
History of illness, injuries and ocular experiences and heredity	Nothing of consequence	History may reveal reason to check either R, T or L, or all.
Present health	Good	If poor and attended check T. If poor and not attended check R.

TEST	NORMAL	INDICATIONS
Vision to which patient is accustomed with old glasses if worn. Otherwise without glasses	O. U. 20/20 O. D. 20/20 O. S. 20/20 O. D. = O. S.	If either or both below normal or if O. D. and O. S. are not equal, take pin-hole vision. If O. U. is not better than both O. D. and O. S. check T.
Vision with pin-hole (not required if above is normal) (before old lenses if worn)	O. D. 20/20 O. S. 20/20	If better than above check L. See ophthalmometer note of corneal regularity. If worse than above check R and T. See notation of opthalmoscope.
Superficial examination	Healthy tissue. No inflammation. No wrinkles.	Exudation, check R. Inflammation, squint or frowns, check T and L.
Ophthalmoscope and oblique illumination	Clear media. Normal fundus.	Media not clear, check T or R. Pathologic fundus, check R.
Ophthalmometer	O .D. and O. S. { Primary 42. Secondary 42½. Regular.	O. D. and O. S. other than normal but regular and similar, check L. Irregular, check L. Unequal or extreme, check T and L.
Static retinoscopy less working lens or dynamic retinoscopy at 1 meter	O. D.=Subjective. O. S.=Subjective less than 1 D.	Error less than 1 D. see phorias vision and complaints, possibly check T. Error equal subjective, check L. Error not equal subjective, check T and L. Note whether above or below subjective.
Dynamic retinoscopy net. Less deductions for physiologic lag and age	O. D.=Subjective. O. S.=Static retinoscopy	If not equal subjective and static retinoscopy, Check T. Note if above or below subjective.
Subjective refraction at 6 m.	O. D., O. S.—Practically equal and less than 1 D.	If less than 1 D. see complaints phorias and retinoscopy. Possibly check T. If 1 or more, check L. If O. D. and O. S. decidedly unequal, check T and L.
Disassociated visual acuity with final subjective	O. D., O. S.—Equal and better than pin-hole vision. Equal to or better than accustomed.	If unequal, check T. If lower than pin-hole check T. If lower than accustomed, check T. If better than any above check L regardless of slight error.

TEST	NORMAL	INDICATIONS
Phorias at 6 m. under slight fog. Note: Fractions of Δ should be ignored.	1Δ Exo. equal to phorias with keen vision.	If esophoria, check T and consider maximum plus sphere with maximum cyl. If higher exophoria check T and consider minimum plus sphere and minimum cyl. and study history and health. If vertical, check T and study history and health.
Phorias at 6m. keen vision.	1Δ Exo.	If nearer normal than under fog, check L regardless of low error and if not equal to phorias under fog, check T.
Red glass over one eye, produce diplopia with prism, then remove prism.	Images fuse instantly.	If diplopia persists, Rx may include prism, check T. If fusion is slow, check T.
Ductions prism base-in	Diplopia Rec. 10 8 (5/4 ratio)	If low, check T. If ratio is high, or both very low, check T and R.
Vertical	B. U. O. D. } 3/2 B. D. O. D. }	If nil or ratio extreme or unequal, check T.
Base-out	Blur 9/20/10 Blur Rec.=5/4 Diplop. Rec.=2/1	If low check T. If ratio is high check T and R. If all ductions are low check T and R.
Vergence effect on phorias.	Lateral, ML Both eyes up, slight increase in exo. Both eyes down, slight eso.	If rotating both eyes in the same direction decidedly affects phorias, check T.
Physiologic exophoria at reading distance with Static Rx	Consider age 4Δ exo higher in old age	In youth if not normal check T, and check L in spite of low errors, and possibly R in definitely presbyopic cases, ignore in border-line ages (37 to 45) compare to P. Ex with add.
Crossed cyl. "Presbyopic test"	Consider age	If "add" is indicated in youth, or too great an "add" according to age, check T and R; whenever add is indicated check L.

TEST	NORMAL	INDICATIONS
Physiologic exophoria at reading distance with reading add.	Consider age. 4Δ exo., higher in old age; same as Ph. Ex. with static Rx.	In youth if not same as P. Ex. with static Rx check T and L in spite of low errors. In presbyopes if not normal check T, L and possibly R. In borderline ages if nearer normal than P. Ex. with static Rx check L and possibly T. If farther from normal check T and possibly R. Note: Physiologic exophoria is exophoria at reading distance minus exophoria at 6 m. Esophoria being considered negative exophoria.
Accommodation reserve (portion of amplitude **unused** when add if any is worn)	Not less than half the amount used except in extreme old age	If low check T and possibly R. Check L when error seems low.
ΔBase out reserve (at reading distance with reading add)	21/14 3/2 ratio	If low or if ratio is high check T and R. If high (ratio normal) as compared to base in check T.
ΔBase in reserve (at reading distance with add)	24/18 4/3 ratio	If low or if ratio is high check T and R. If high (ratio normal) as compared to base out check T.
Glarometer	0 to plus 5 points	If high check L regardless of error and possibly T. If negative check L and T.
Perspective	According to device used	If poor, check T.
Color vision	5 spectral colors at least or standard tests	If poor, check T and R.
Transillumination	All clear	If shadows are found, check R.
Color fields	See standard charts	If not normal, check R and possibly T.

DR. CARL W. SHEPPARD and DR. W. A. MENDELSOHN,
863 N. LA SALLE ST.,
CHICAGO, ILL.

THE PSYCHO-PHYSIOLOGICAL AND PHILOSOPHICAL ASPECT OF THE OCULAR APPLICATION OF PHYSICAL THERAPY*

J. I. Kurtz, B. Sc., A. O., F. A. A. O.,
Minneapolis, Minn.

The successful application of ocular physical-therapy requires that one should have a clear understanding of its philosophy as well as its psychological and physiological effects on the human system. We can hardly study one phase of this subject without also studying the other. One can not study physiology without encroaching upon the field of psychology, neither can we study psychology without going into the realms of philosophy. In trying to get a clear conception of the scope of each one of the three mentioned subjects one naturally must first define them.

Physiology is known as the science which treats of the functional workings of the body in health as opposed to pathology which treats of its functions as disordered by disease.

Psychology is defined as the study of the mind or of "mental phenomena," or of the higher functions of beings endowed with mind. This definition emphasizes the fact that ordinarily the term is restricted to the study of the mental functions connected with living organisms.

Physiology and Psychology are closely related, as all mental states, according to James[16] are followed by bodily activity of some sort. These two subjects overlap each other's field to a considerable extent. Watson[17] contends that physiology is psychology's best friend among the biological sciences. We can hardly move a step in psychology without using physiological data. We cannot go very far in our study of psychology without encroaching upon the field of philosophy. And what is philosophy we may ask? The answer to this question is more difficult than would appear to us on first thought. It is easier to study philosophy than to define it. You will probably get a better idea of what philosophy is if I will define for you a philosopher as it was defined for me by one of my professors under whom I studied this subject at the Ohio State University. He defined a philosopher as a blind man in a dark room looking for a black cat which is not there. If we study the meaning of the word philosophy we find that it means the love of wisdom, as

*An abridgment of the material presented before the American Academy of Optometry at Boston, Mass., Dec. 17, 1929.

leading to the search for it; hence the resulting knowledge of general principle elements, powers, or causes and laws explaining the facts and existences. Plato says in his "Republic," "But who are the true philosophers? Those I say, who are lovers of vision of truth." Hence philosophy is the science of rational principles[18]. It is the product of human thought, acting upon the data given by the world without, or the world within, and eliciting from these data principles, laws and systems. It is the all embracing system that furnished the ultimate rational explanation of all things, thus the sciences find their only complete explanation in philosophy. In the study of physical therapy we, therefore, think that it is of great importance to avail ourselves not only of the physiological or psychological aspect, but of the philosophical aspect as well. If ocular physical-therapy is a science, and we believe it is, it seems to us to be of utmost importance to study and understand its philosophy. Its practice should therefore be combined with the philosophical conception of nature and her laws. All modern therapy has as its end rational co-operation with nature and nature's laws. We know, for instance, that heat and light are necessary for life and body metabolism. No organ of the body can function properly without a considerable amount of heat. If this heat is removed, by any means, muscles become stiff and weakened, nerves are deadened, sensations abolished, circulation becomes sluggish, and function is generally seriously impaired.

Heat and light are essential to the well being of the individual, and if possessed in adequate amounts, they produce comfort not only of the body but of the mind as well. When we are deprived of light even for brief periods, we experience a depression of body, and gloom in mind. Mental cheer and a sense of well being are the known products of a proper supply of light and heat. The sedative and comforting effects of heat in painful conditions are well known to all of us. Muscular spasm relaxes most readily under the continuous application of various forms of heat supplied by physical therapy agents, circulation is increased and equalized throughout the body. Lymphatics are opened up for renewed action in disposing of waste products. The modern optometrist in his treatment work is applying 80 per cent or more of the physical agents which are being classified as members of the physical therapy group. Are we not utilizing at least in 80 per cent of our treatment work the powerful and natural agencies of heat and light as methods of assisting nature to reestablish normal function? Of course, we do. Then we, as optometrists, are using physiotherapy whether we admit it or not and why shouldn't we? Is not physiotherapy mostly the application of "radiant energy" of one form or another, and will anyone question optometry's right to study and apply radiant energy? Why all optometrists are doing every day in their practice is the application of

radiant energy. The application of ocular physical agents in physiotherapy by optometrists is a natural part of optometric practice. This statement is sound from a physiological, psychological and philosophical standpoints.

Physical agents which have a beneficial effect when applied to the human body are numerous. Some of those which are of greatest interest to us are:

A. High frequency currents.
B. Diathermy.
C. Sinusoidal and galvanic currents.
D. Actinotherapy.
E. Massage—Mechanotherapy.
F. Lenses and prisms.
G. Psychotherapy.

The application of different kinds of physical agents to parts of the human body, which function abnormally have a profound physiological and psychological effect. In order that we may have a clearer understanding why the application of physical agents in certain cases will produce certain effects it is important that we have a clear understanding of the physiological activity of the human body. For this purpose we will briefly review some of the well known physiological principles and functions.

General Physiological Considerations

The human organism it is claimed is dependent for its growth and functional activity upon potential energy, which is stored up in the food. This food is derived directly or indirectly from vegetable substances. All energy it is claimed comes directly from the sun in the form of radiant light and electrical waves. This heat in turn is absorbed by the vegetables and is used to break up carbon dioxide; from the atmosphere; into carbon and oxygen. The oxygen is given off back to the atmosphere while the carbon is combined with water to form the organized structure of the plant or tree. Through the process of transformation of energy it is thus transformed into potential chemical energy which is stored up in the carbon of the plant on the one hand and the freeing of the oxygen on the other. This stored up energy is used for the performance of the different physiological functions in the animal organism. When one is lifting a weight the energy expended in this act involves the recombination in the muscle fibers of the carbon obtained from the digestion of food and the oxygen brought from the lungs by the red corpuscles.

Physiological Considerations From an Electrical Standpoint

In order to maintain the health of the human organism it is not only essential that we have proper digestion and absorption of food and a sufficient supply of oxygen, but it is also important that we have this special *life force* or *vital energy*. It is becoming more and

more of an accepted fact that the whole scheme of life involves the action of this special force, which is produced by electricity, according to the findings of Crile[2] and others.

Through the action of this great force electrons are formed into atoms, atoms into molecules; molecules into crystals and chemical compounds and these in turn form into the cells and bodies of plants, animals and man.

With the development of modern science more and more recognition is given to existence of this *life force* or *vital energy.* Simple animal organism like the amoeba, and simple cells of the embryonic type appear to possess the power of absorbing vital force from the food and air and of using it in maintaining their function of growth, reproduction, etc. Some cells lose this power of direct self vitalization and must be sustained by stimulating forces carried to them from the nerve centers. These are usually highly specialized cells, such as muscle fibers. The vitalizing centers, which furnish the sustaining force to the specialized cells, are situated in the interior horns of the spinal cord for the motor nerves and voluntary muscles, and in the posterior spinal roots, for the sensory nerves. To the visceral organs and to the unstriped muscles the life force is distributed through the sympathetic nervous system. Some of the most important functions of the human system, which are involved in the preparation and distribution of the food material and oxygen are:

1. The digestive system.
2. The absorbent system.
3. The distributing system.
4. The respiratory system.
5. The excretory system.

The functions just enumerated are maintained and regulated by *vibrations* and *oscillations,* transmitted through the sympathetic nervous system, which consists of a double chain of nerve ganglia and filaments radiating from the great centers. Almost all parts of the body are provided with sensitive, bulb-like structures called "Tactile corpuscles" each of which is connected to a sensory nerve filament, which passes through the spinal cord to the centers of sensation in the brain. These filaments pass through large nerve cells in the spinal cord which act like *batteries supplying energy for vibratory impulses which cause sensation.*

Electric Energy.

To discuss fully the part electricity plays in the functioning of the human machine would require a good size volume in itself, we could not do justice to the subject in this short thesis, we will therefore limit ourselves only to a few generally accepted facts regarding electricity, which will help give us a clearer conception of the important role it plays in the functioning of the animal and human

mechanisms. In discussing this subject Dr. Perrine[3], electrical engineer of the Department of Development and Research of the American Telephone Company of New York in his essay on a "Consideration of the Energy Transformation in the Body From an Electrical Standpoint," states that electrical impulses must be supplied to the organs and muscles of the body in order that a living organism be maintained. This necessitates a supply of electrical energy which in turn means a transformation of chemical energy, into electrical potential, which is one of the two factors involved in electrical energy, the other being quantity of electricity, which is called the current, measured in amperes.

The amount of electrical energy output in the body is considerably reduced in case of fatigue, or shock. Donne in his researches reaches this conclusion: Electric currents exist in animals, at the surface of the membrane and in the various organs. Electricity acts in two ways in the animal economy. It may produce contractions and other derangements of the equilibrium of the organic parts or it may control the chemical reactions which either promote the secretions or are prejudicial to their production. Life from an electrical standpoint is due to a state of unbalance between the positive and the negative elements in the protoplasm, in other words life according to Crile[4] is due to the positive and negative electrical elements of the protoplasm. From the preceding discussion it can be seen that the human mechanism cannot function properly without *electrical energy.* The question may be raised why should the optometrist interest himself in this subject of the role electrical energy plays in the proper functioning of the human machine and is not this outside the scope of optometry? This question can best be answered by trying to find out first what is electrical energy. It is an established fact that light energy or sunlight is electrical energy. Is there anyone who can logically contend that a study of the application of the subject of *light* is outside of the scope of optometry? Hardly. Because this question has already been settled by the highest courts sometime ago. Now let us see what evidence is there to prove our contention that *light energy* is *electrical energy.* Crile contends that according to the electronic theory "light waves" are electrical waves, and the light of the sun is electric energy transmitted by the constant emission of electrons from the vast number of electrons constantly vibrating within the body of the sun itself. Light, then, is electricity, and the effects of light are the results of the application of its electrical energy and are to be interpreted by the laws which govern electrical energy.

That sunlight is electricity is shown by its capacity to induce positive charges. This has been demonstrated by Nodon[3] in his observations of the electric action of the sun and moon, from which he concludes that "the sun induces a positive electric charge" and that

"the full moon produces a positive electric induction analogous to that of the sun." Various investigators have produced formaldehyde by the action of sunlight on water and carbonic acid in the presence of salts of iron or other inorganic sales; and by the further action of sunlight or of ultra-violet light on formaldehyde, carbohydrates sugars have been produced. That is, sunlight electric energy can produce organic compounds from inorganic elements.

The phenomena of heliotropism as demonstrated by Loeb and his conclusion therefrom are strong arguments in favor of the assumption that the animals thus activated are electric mechanisms and that the energy that activates them is electricity.

Not only is electrical energy the results of light energy application, but heat energy without which the human machine could not exist, in common with electricity and with light is radiant energy; and while the latter forms of energy are electronic phenomena, heat is concerned with the activities of atoms and molecules. Heat being radiant energy, its manifestations are therefore governed by the same physical laws as those which govern electric and light energy.

The general constitutional effects of therapeutic currents are:

1. Increased general metabolism.
2. Increased glandular activity.
3. Increased body heat.
4. Increased secretion.
5. Increased elimination.
6. Increased oxidation.
7. Lowers high blood pressure.
8. Soothing to the nervous system.
9. It relaxes cramped and spasmodic muscles.

While we know something of the role the electric current plays from a general physiological standpoint it may be of interest to learn of the effect of electric currents upon the following:

a. The cell.
b. The blood vessels.
c. The muscle.
d. The nerves.
e. The brain.
f. The eye.

The cell is the physiological working basis of all organism, vegetable as well as animal and it must have a proper electrical balance, without this it ceases to function. The human body is considered to be one of the most complete and efficient laboratories there is in existence. Each cell is considered to be a little workshop where the work of metabolism is carried on. The primary function of the cell is to fabricate electric energy and the acids produced by oxidation contribute to the production of electric energy just as acids and bases

of a man-made battery contribute to its proper functioning. It is a well established fact that the application of heat to the cell increases oxidation and when the heat is concentrated too much it may cause the destruction of the cell. High frequency and diathermy currents when properly applied will not only increase greatly the supply of fresh arterial blood, but also will hasten the escape of waste products through the channels of the dilated capillaries and thus increase cellular efficiency. *It is an established clinical and laboratory fact that cellular activity is increased by the application of a moderate degree of heat and that all electric currents increase metabolism.*

The changes in the cell are not due merely to heat energy developed within the tissues but to the mechanical bombardment of the electron of which the cell is composed. The oscillating character of the current, it is claimed, must induce forth and back movement of the cells themselves, which increases not only their chemical activity but their mechanical as well. Baum and Robertson have proven that cellular activity is dominated by electrical phenomena.

Whenever physiologic inactivity of a cell takes place a pathologic inactivity follows. The cell then becomes a waste product which must be taken care of by increased activity of the other cells. The other cells can be stimulated to greater activity through the application of therapeutic currents.

The blood vessels. The effect of a diathermy application upon the blood vessels is one of vaso-constriction. This is followed by dilation of the capillaries. The increase in activity in arterial circulation mechanically relieves venus congestion. Arterial tension may be raised or lowered depending upon the technic of application.

The muscles. The application of high frequency currents does not cause them to contract but they may be made to do so by introducing of an air gap into the circuit. Muscles depend upon their controlling nerves for stimulation. The severing of the nerve connection between the brain and the muscle leads not only to paralysis but to atrophy of the muscle as well. Muscles deprived of their nervous control may have their nutrition sustained by proper application of diathermy[5]. No muscular atrophy will set in as long as the muscle will be made to contract at regular intervals by electric stimulation. It has been demonstrated that not only is the stimulating nerve current to the muscle an electrical current, but in the response itself electricity or heat or both are generated. Electricity[6] does for the muscle, as far as its function and nutrition are concerned, what the brain does for it. Therefore, electricity is adapted to the muscle and the muscle is adapted to electricity.

The nerve. The passage of an electrical current through a nerve will cause certain changes to take place which alter the excitability and conductivity of the nerve[7]. It is an established experimental fact that we may excite a nerve by the starting and stopping of an

electrical current, and that the current enters the nerve at the positive pole, or *anode*, and leaves it at the negative pole, or the *cathode*. Electrical currents, claims Wundt[8], lend themselves best for the external stimulations of the nerve by virtue of the ease with which they destroy the molecular equilibrium of the nerve elements.

The nerve cell and is processes, which are composed of highly specialized forms of protoplasm, possess the capability of transferring impulses from point to point of their substance. These impulses are conveyed in one direction only from dendrite to axon, through the cell. In considering the passage of an electrical current between the neurons and the muscles one must bear in mind that the neurons are not in direct physical contact with each other, that the lines of communication between the neurons and the muscles, etc., are broken up by synapses as was so ably explained by Dr. Wiseman on Sunday. The synapse may be considered as a highly adapted switch which at some times opens the circuit and at other times closes it, at times it diminishes the flow of current, at other periods it accelerates it. As an electric current flows constantly from an era of higher potential to an era of lower potential, hence, the nerve cell which is the electric battery of the human system would be in constant action were it not for the intervention of the synaptic switch. This would result in the constant work of the nerve cell which would become exhausted exactly the same way an electric battery in a closed circuit becomes exhausted. Also the gland or the muscle which is stimulated by this constant flow of nervous energy—electricity—would become completely exhausted.

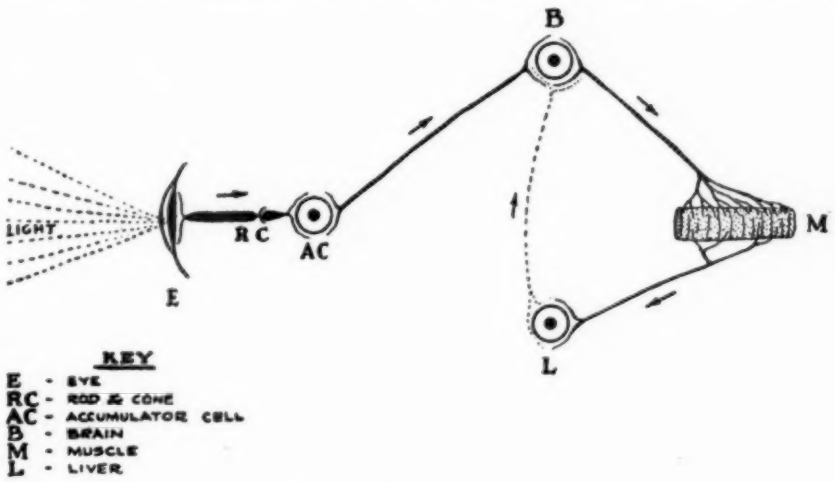
The synapse becomes more resistant to the passage of the nerve current when the axons and dendrites are affected by toxins due to fatigue, etc. The muscles which depend for their nervous energy upon these affected nerves suffer and fail to function properly. *This is the beginning of physiological inactivity, which if not cared for promptly will develop into a condition of pathologic inactivity.* As all pathological conditions are usually preceded by a condition of physiologic inactivity it becomes of extreme importance from a preventative standpoint that something should be done to restore the normal nerve energy flow across the synape to the muscle, to re-establish normal physiologic activity and thus prevent the development of pathology. Most all authorities are agreed that the proper application of physical agents, such as therapeutic current, massage, exercise, etc., will help remove the condition which caused the synaptic resistance and the blocking of the nerve energy flow which in turn is responsible for the development of the physiological inactivity.

Most all of the ocular cases which suffer from physiological inactivity reach the optometrist long before there is any evidence of pathology, hence it becomes the duty of the optometrist to equip

himself with the knowledge and instrumentation to be able to properly diagnose and treat these cases and prevent any pathological development. That the treatment of physiological conditions is properly within the sphere of optometry no one will deny.

Dr. Troland[9] in a recent lecture on the significance of nerve physiology for optometrists, discussed the subject of nerve energy conductivity very thoroughly. He contends that proper understanding of the nervous mechanisms which are involved in vision is an essential for the most successful practice of optometry. If the nerve mechanisms are functioning properly, in any particular case, the refractive analysis may be all that is required, but in the *beginning,* you do not know the actual cause of the trouble. If you attempt to correct a nervous difficulty by purely optical methods, the end result may be very bad for the patient. He claims that if the retinal image is out of focus appropriate currents are sent out along the different nerves to the muscles which govern the lens, the pupil and the eyeballs as wholes. Now if these nervous mechanisms of adjustment do not function properly there will be just as much trouble at the receiving station—the brain—as if the apparatus at the transmitter were optically inadequate. In discussing the conductivity and distribution of nervous energy, he states that if we are given the proper knowledge of nerve anatomy of the momentary distribution of synaptic resistances, and of the stimulus, we should be able to predict the manner in which the end organs—muscle or gland—will behave.

It may be of interest to try and trace out the stimuli set into



J. I. Kurtz. Fig 1. Schematic plan of theorethic complete sensory motor circuit. (Courtesy of G. W. Crile.)

motion by a ray of light entering the eye. Crile[10] in discussing the electrical forces and their effect on the organs of the body, claims that when a ray of white light is impinging upon the retina it would set free successively the electrical charges of the surface cells and the amplifying cells of the retina. These charges are conveyed by the optic nerve to cells in the gray matter of the brain. From the brain the energy current travels on to the muscles and from there to the point of lower potential as shown in Fig. 1.

We have thus far discussed the physiological effect of therapeutic currents which constitute a major branch of physiotherapy. We shall now briefly discuss their psychological effect. All of us who had considerable experience in ocular treatment work realize that the psychologic effect of the treatment upon the patient is to a great extent a determining factor as to what results we will get with that case. The fact that in most cases when a therapeutic current is applied the patient will invariably voluntarily remark "how fine it feels" tends to show that the patient under treatment has the proper psychologic reactions. Another fact we must not overlook is this, that nearly all of the present day optometric forms of treatment are of a subjective nature, while nearly all physiotherapy treatments are objective, this is another psychologic advantage.

Psychotherapy or *suggestion* has also a very important and favorable therapeutic effect. Mental processes and reactions are subject to the same physical laws as are any other organs of the human machine. The intangible nature of these processes and the fact that we are dealing with infinitesimal forces and infinitesimal particles of matter, make a demonstrable explanation impossible. Nevertheless[11] on the basis of what is demonstrable, both by the gross and microscopic structure of the brain and by the demonstrated laws which govern electric forces and by some experimental evidence obtained in some psychological laboratories we are justified in stating that *certain mental processes set into action through suggestion will generate certain electric currents which will prove to be greatly beneficial to any abnormal organ.* This has especially proven to be true in many cases treated since the last war. With the accumulated knowledge of modern psychology more and more practitioners are constantly devoting more attention and time in trying to relieve the state of mind of the patient, because it is found that the patient's *fear* and *worry* cause certain abnormal conditions to exist and create a state of mind in the patient which becomes a determining factor in the outcome of the case. That health depends much on our mental state is a fact which is being more keenly realized today than ever before.

Functional or pathological abnormalities may be produced or aggravated by emotions of fear, apprehension, worry and similar psychic manifestations. The wholesome effects of cheer, hope, opti-

mism, courage and other exhilarating emotions are marvelous in their therapeutic power. If the practitioner himself possesses these characteristics fortunate indeed are his patients. If he can instill these psychic emotions into his patients he is indeed a philosopher and certainly a good psychotherapist. From my own experience, I can state that the success I have had in recent years with some of my most difficult cases was due mainly to the proper application of proven psychological principles. Some of these cases have been previously for months and years in hospitals and sanitariums under the care of the best medical men and failed to show any improvement.

A case in point is Mr. L., age 52, clerk of district court, was sent up by his physician for an eye examination on May 28, 1927. Upon taking his history, we learned that he had a nervous breakdown and that for the last four years he had been treated by a number of leading specialists and that he had spent some time in hospitals and sanitariums, but he failed to get any improvement. Upon examination, we found a moderate amount of hyperopia which was previously corrected by another refractionist. He also had 4 P. D. of esophoria, low adduction and no abduction. His fusion reserves both positive and negative were low. I was reluctant to prescribe oculo-prism treatment although the patient having heard about these treatments wanted to get started at once. Having tried so many other types of therapies without getting any results he was ready to try something different, however, we advised against it for the time being, and advised instead for him to go away for a vacation for three months to the northern part of Minnesota and to come back for a re-examination upon his return. He followed our advice and left for his vacation the next day. He had no difficulty in getting away in view of the fact that he had a deputy do his work in court for the last four years, as he was unable to do any work himself during all that time.

After being away on his vacation for ten weeks he called again for a re-examination. He claimed to feel some improvement. Upon examination it was found that his esophoria practically disappeared and his adduction was O. D. 16/12; O. S. 16/12; abduction was O. D. 3/1; O. S. 3/1 (the numerator designates the break and the denominator the recovery point).

He was anxious that we start oculo-prism treatments although the three months were not up. This we did, and in about fifteen treatments his adduction and abduction were practically normal, his fusion reserves were also improved. The patient was very much elated over the fact that he noticed a gradual improvement of his condition. I, too, was pleased with the results. It may be of interest to you, as it was to me, to learn that after the first treatment he

went directly from my office to a heart specialist and had his heart examined, then he went to the nerve specialist for an examination, as he wanted to know whether or not these treatments were affecting his physical or his nervous system. Fortunately, these examinations did not reveal any bad after effects. He told me about this a few days later. Of course, this still further strengthened his confidence that these treatments will be of great help to him.

After treating him for another month, there was very little change in his duction and fusion power but the patient kept on feeling a steady and gradual improvement and kept on expressing his belief that he will get entirely well if he will keep on taking the treatments long enough, as this is the only therapy in the last four years that really helped him on the road to recovery. I was then confronted with a dilemma. As far as I was concerend, I had nothing else to offer in his case, as I accomplished all that I set out to accomplish and was ready to discharge the case but as far as the patient was concerned he just began to recover. I discussed the case several times with Dr. Koch and we both felt that from an ethical standpoint the patient should be discharged at this point, as I could offer him nothing further, but from a practical standpoint the patient was in a psychic state where he felt that he at least has found a place where he is going to be helped back to health and if treatments were discontinued at that time, he would probably make no further headway. I then decided to keep him coming until he is completely well again or until we reach a stage where he does not notice any further improvement. We gradually cut down on the number of treatments from six to three a week, later on the treatments were still further reduced until we finally had him coming only once a week. This was kept up until May, 1928, when we felt that he was able to do all of his work in court the same as he had five years ago, before he had the nervous breakdown. I might mention this point which may be of interest that when I started to work on him he had no confidence at all in his own ability, he collapsed each time he merely took the pen in his hand to sign his name. All during the treatment period I made him do some work in his office for very short periods at the beginning and increased these periods gradually as his condition improved. And when I was finally ready to discharge this patient, I instructed him to send his deputy away for two months' vacation and that he himself shall do all the work in his office without any assistance. He was afraid at first to make such a daring move, however, my assurance that he is perfectly able to attend to all the duties of his office was the finishing touch to help him regain complete confidence in himself. On the next day, he sent away his deputy on a long vacation and himself assumed all of his duties in court chamber. He reported at the end of one month that he was not only able to do all of his work but that he is feeling stronger right

along. This patient reports for a re-examination every three months and we find that he is in perfect condition, and is one of our most satisfied patients. Now if we go back to our classification of physical therapy agents we find that a combination of the last two agents named, that is, lenses and prisms, and phychotherapy, were responsible for our successful results in this case.

That psychology and mental attitudes play an important part in ocular abnormalities is gradually being accepted by medical and non-medical practitioners alike. Dr. Uddgren[12] of Sweden speaking before the Medical Women's International Association at Bologna, Italy, at the 1928 Congress presented interesting data concerning the effects of mental attitudes and general body illness, on the refractive condition of the eyes. Dr. Uddgren reported cases of children where the visual acuity was 20/100 which was restored to normal by purely psychological treatment. In another case vision was reduced to the counting of fingers and was restored to normal by psychological treatment. There is a case on record of a girl who developed severe ocular disturbances, refractive anomalies and intrinsic lowered acuity, every time she had to take an oral or written examination. The mental tension incident to the examination caused these changes.

A knowledge of these facts is of importance to the modern optometrist. If worries, fears, obsessions and the numerous complexes within the minds of our patients can modify the refractive condition of their eyes and if disturbances of refraction and vision can be produced by disturbed psychic states, then the remedy in these cases is psychotherapy.

The Effect of Massage

Massage has a stimulating effect upon the muscles. The muscles when massaged or exercised receive a considerably larger supply of blood than when they are inactive. Dr. Bennett can tell more about this subject. Kellogg[13] claims that the muscles constitute one-half of the bulk of the body and receive only one-fourth of the blood of the body, and while they are constantly receiving a certain blood supply, it is very small except for the time when the muscle is active. Massage will cause the blood to go through the muscle instead of around it as is the case when the muscle is inactive. We are all aware of the effect of exercise upon an organ of the body, massage[14] is a passive form of exercise producing beneficial results in many cases. We may thereby increase circulation in a given part, sedate an aching muscle or nerve, stimulate the flow of lymph, increase heat, blood flow, and nutrition in abnormally functioning muscle. All these results may be accomplished without any expenditure of nervous energy on the part of the patient that is being treated. In many cases lack of innervation and inability to innervate the muscle

leads to atrophy. Persistence massage and the application of heat wards off this condition to a great extent; and after a certain lapse of time perchance the disordered nerve may be restored to function, partially at least. When this occurs the convalescing nerve will find more vigorous muscular tissue to act upon because massage helped in the upkeep of muscular nourishment.

The effect of lenses and prisms are purely physical and are too well known to all of us and needs no further discussion. Most of the time allowed to me I have taken up in discussing the general effects of the application of physical agents. However, I realize that most of you are interested to know something of the specific effects of the ocular applications of physical agents. Time will not permit to go into a complete discussion of this subject giving technics, dosage, etc., we will therefore try to enumerate a few of the many satisfactory results obtained by some of the practitioners who have been making use of ocular physiotherapy.

Cases successfully treated are: Conjunctivitis, blepharitis, iritis, hordeolum, chalazion, optic atrophy, neuritis, corneal ulcers, corneal opacities, vitreous opacities, lenticular opacities, trochoma, glaucoma, amblyopia, muscular abnormalities and cataract. Some of the conditions enumerated here are distinctly outside of the sphere of optometry and are only mentioned so that we may know that some of our patients may benefit more in some instances if we refer them to a medical electro-therapist, other conditions again are within the sphere of optometry and it will be of material benefit to both patient and practitioner if physical agents were applied by us in these cases.

Duke Elder reports very satisfactory results from the application of physical agents in cases of blepharitis, corneal ulcers and conjunctivitis. Personally, I have found that ocular pains and frontal temporal and occipital headaches are greatly, if not entirely, relieved by the application of high frequency or diathermy currents. In some cases where the pain was so acute before the treatment that the forehead was painful to the touch, I found that after the treatments the pain entirely disappeared and any amount of pressure on the forehead could be tolerated without any painful effects. I have also found these currents as a valuable aid in the treatment of amblyopia.

Koch reports a case of a woman whom he treated in order to build up her fusion reserve and after applying high frequency currents preceding the regular oculo-prism treatment, he found that a positive scotomata area of long standing disappeared at the conclusion of the treatment series.

Drs. Spitler, Cox, Rubley, Harris and others report successful results in the application of physiotherapy in cataract cases and lenticular opacities. The improvement in vision in some of these cases was remarkable.

Summary

1. This paper deals with psycho-physiological and philosophical aspect of the application of ocular physical agents.

2. Physical therapy is made up of a number of physical agents. Most of these agents are the direct or modified applications of radiant energy in one form or another.

3. Through the application of physical therapy we can supply the electrical impulses which must be supplied to the organs and muscles of the body in order that living organisms be maintained. The human mechanism cannot function properly without having a proper supply of vital energy.

4. Electrical energy is the basis of all vital energy, and electrical energy has been proved to be light energy—sunlight, etc., that is radiant energy.

Physiological effects of therapeutic currents:

a. Produces heat.
b. Increases cellular activity.
c. Increases metabolism.
d. It constricts the blood vessels and dilates the capillaries and those cause a flow of fresh oxygenated blood into the part to which the treatment is applied.
e. It causes the absorption of waste products.
f. Increases glandular activity.
g. Increases secretion and elimination.
h. Lowers high blood pressure.
i. Relaxes cramped and spasmotic muscles.
j. It is soothing to the nervous system.
k. It is a great pain relieving agent.

5. Ocular physiotherapy when applied in time will re-establish physiologic inactivity which always precedes pathological inactivity and will then prevent the development of pathological conditions.

6. Psychotherapy which is a part of physiotherapy has proven to be a very valuable aid in treating difficult eye cases, as our health depends to a very great extent on our mental states, the application of psychotherapy becomes an important factor to the modern practitioner.

Conclusion

1. Physical therapy is made up of the application of a system of physical agents. Most of these agents constitute the application of radiant energy of one form or another.

2. The study and application of radiant energy is a natural part of the practice of optometry.

3. The application of ocular physical therapy in the treatment of physiological ocular abnormalities will result in the prevention of the development of pathologic conditions.

4. As most ocular cases of physiological inactivity (the condition which prevails prior to the development of pathologic conditions), come first to the optometrists it becomes our duty to apply all the physical agents at our command in order to re-establish physiological activity and thus prevent the devolpment of pathologic conditions.

DR. J. I. KURTZ,
1501-1504 FOSHAY TOWER,
MINNEAPOLIS, MINN.

BIBLIOGRAPHY

[1]J. I. Kurtz, "Ocular Electrotherapy," American Journal of Optometry, Volume 6, No. 10, pages 569-573.

[2]G. W. Crile, "The Bi-polar Theory of Living Processes," pages 12-15 (McMillan Co., New York).

[3]J. O. Perrine, Essay on "A Consideration of the Energy Transformation in the Body from an Electrical Standpoint."

[4]G. W. Crile, "The Bi-polar Theory of Living Processes," page 148 (McMillan Co., New York).

[5]B. B. Grover, "High Frequency Practice," page 97.

[6]G. W. Crile, "The Bi-polar Theory of Living Processes," page 88.

[7]J. I. Kurtz, "Ocular Electrotherapy," American Journal of Optometry, page 522, Vol. 6.

[8]Wilhelm Wundt, "Principles of Physiological Psychology," page 58.

[9]L. T. Troland, "Significance of Nerve Physiology for Optometrists," Lecture before New England Council of Optometry, Optical Journal, April, 1929, page 23.

[10]G. W. Crile, "The Bi-polar Theory of Living Processes," page 131.

[11]G. W. Crile, "The Bi-polar Theory of Living Processes," page 130.

[12]Jas. I. Pascal, "Correcting Ametropia Without Lenses," The Optician, April, 1929, page 137.

[13]J. H. Kellogg, "The Art of Massage," page 25.

[14]J. C. Elsom, "Philosophy of Physical Therapy," Archives of Physical Therapy, 1928.

[15]George H. Giles, "Effects of Ocular Exposure to Ultra-violet Radiation," The Common Wealth Optometrist, page 4, March, 1929.

[16]William James, "Psychology," page 5.

[17]John B. Watson, "Psychology," page 24.

[18]J. C. Elsom, "Philosophy of Physical Therapy," Archives of Physical Therapy, 1928, page 72.

AMERICAN JOURNAL OF OPTOMETRY

VOL. 8 JULY, 1931 NO. 7

EDITORIAL STAFF

DR. CAREL C. KOCH, Editor
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

DR. JACK I. KURTZ, Associate Editor
1501 Foshay Tower
821 Marquette Avenue
Minneapolis, Minn.

Original papers, scientific communications, clinical reports, society proceedings, books for review, and correspondence should be sent to the Editor.

Annual Subscription, $3.00 in Advance. Canada, $3.50. Foreign, $4.00.
Single Copies, 40c.

Copy of advertisements must be sent in by the tenth of the month preceding their appearance. Subscriptions, applications for single copies, communications with reference to advertising or other business should be addressed to the Business Manager, Dr. Jack I. Kurtz, 1501 Foshay Tower, Minneapolis, Minn.

Published Monthly by the
American Journal of Optometry Publishing Association.

The Journal has no objection to the reprinting by other magazines of any of its articles, provided such reprints are properly credited to the American Journal of Optometry

AN EASIER PROCEDURE TO FOLLOW IN MAKING AN OPHTHALMOSCOPIC EXAMINATION

From time to time the suggestion is made that in making an ophthalmoscopic examination the simplest method is to have the patient recline and to work with the ophthalmoscope from behind the patient. Skeffington has used this technique for years and the writer also made this suggestion before the American Optometric Association in Grand Rapids in 1928. However in discussing ophthalmoscopy with various optometrists it seems that very few men have attempted to use this diagnostic technique in this manner. The usual procedure seems to be to have the patient sitting upright, fixing some object directly before them. This is, in the writer's belief, a most difficult and unhandy method and for that reason he again presents what appears to be the easier method, this time quoting from Dr. W. E. Fannon of the College of Optometry of Toronto, who in a paper on Pathology in the Canadian Optometrist says: To use the ophthalmoscope by the indirect method to the best advantage proceed as follows:

First, tilt the chair back so that patient is in a reclining position and direct him to look straight up towards the ceiling. Take up your position behind patient's head, or rather at top of it. Chair should be as low as possible. Holding auxiliary lens in left hand between thumb and first finger, rest the ring and little fingers on his forehead. Hold

the 10. D. lens about one inch from eye, and direct light from ophthalmoscope through lens and into patient's eye. Move back and forth until clear view of fundus is seen. You will get a larger field of view and you should see the fundus about the size of and as clear as those shown on the Fischer fundus charts.

The advantages of making the ophthalmoscopic examination while the patient is lying down are many. First, in this position, and patient told to look at the ceiling the eyes will be well opened, whereas in the sitting position patients usually close up the lids from the light. Secondly, you do not have to lean over patient's body or come in contact with him in any way. Thirdly, you do not get patient's breath, or he yours. Frequently this is very disagreeable, not to mention danger of infection from colds, etc. And, fourthly, it is so easy to locate the optic disc.

After you have seen the large area the indirect method gives you, if it is necessary to have a larger view of any one particular part of the retina, then use the direct method and get a magnified view of it, but the field is smaller.

To use the ophthalmoscope by the direct method, you must be as close to the eye as possible, direct the light into the pupil, telling the patient to look straight ahead into infinity. Use the lenses in the instrument until you get a clear view of the part of retina you are looking for. Optometrists are urged to perfect their ophthalmoscopic technique in this manner as they will find it both a simpler and a more accurate method of making their media and fundus examination.

C. C. K.

BOOK NOTICE

SEEING—A PARTNERSHIP OF LIGHTING AND VISION, by M. Luckiesh and Frank K. Moss. Published by the Williams & Wilkins Co., Baltimore, Md. 241 pages, sixty-three illustrations with an illustrated 30 page supplement, $5.00. 1931.

Luckiesh and Moss made a distinct contribution to the field of visual optics by writing the book, "Seeing—a Partnership of Lighting and Vision." The book is made up of nineteen chapters, each one treating different factors which are related to some extent with the act of "seeing." While some of the experiments and results used in the book had been arrived at by different investigators on this subject, most of the material, however, is the result of the researches of Drs. Luckiesh and Moss and their associates at the Lighting Research laboratories at Nela Park. The purpose of writing this book is best expressed by the authors in the preface where they state that "seeing depends upon light and lighting, as well as upon the eyes and the visual sense. Excellent scientific data are available pertaining to

vision; but very generally light and lighting have not received much consideration as a partner of the visual sense. We have summarized the results of an extensive series of researches planned to establish the foundation of a science of seeing. Also we attempted to coordinate and interpret the data so as to be of practical value in utilizing light to aid human beings to see better and more easily, thereby conserving their eyesight and increasing their usefulness." A mere glance at some of the chapter titles will enable the reader to see that the subject-matter treated in this book is of extreme importance and value to the optometrist.

The first ten chapters treat: A Half Seeing World; Fatigue; the Science of Seeing; Visual Acuity; Contrast; Brightness; Speed of Seeing; Precision and Accuracy; the Pupil of the Eye and Adaptation. The remaining nine chapters treat: the Effect of Surroundings; Glare and Visibility; Spectral Character of Light; Subnormal Vision; Characteristics of Objects; Foot Candles and General Lighting plus Psychological Aspects.

In the chapter on the science of vision the authors divide the field in two parts. The first takes in the eye and the adapting of glasses to it. This they claim is the field that belongs to the optometrist, whose function it is to improve seeing. The other part is that of lighting control which belongs to the lighting specialist.

This book contains a wealth of information and will prove of great value to optometrists in their study-research and practice. It should find a welcome place in the offices and libraries of all progressive optometrists.

J. I. K.

THERAPEUTIC USES OF INFRA-RED RAYS, by Dr. W. A. Troup. Published by the Actinic Press, London, England. 57 pages, 16 illustrations. 1930.

In this little book Troup lays greater claim to therapeutic values of infra-red iradiation than has been formerly claimed by other authorities on the subject. He suggests some special technique of application through the use of an Arnold Infra-red Generator with a Troup modified improvement.

J. I. K.

ANNOTATIONS AND SOCIETY PROCEEDINGS

The American Journal of Optometry is the Official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Indiana, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

The following gentlemen have consented to supply items of interest from their respective sections, acting in the capacity of

ASSOCIATE STATE EDITORS

DR. E. B. ALEXANDER
Duncan, Okla.
DR. A. S. ANDERSON
Minot, N. D.
DR. J. F. ANDREAE
Baltimore, Md.
DR. O. E. BELL
Fairmont, W. Va.
DR. C. H. DEGRAFF
Monroe, Mich.
DR. L. P. FOLSOM
South Royalton, Vt.
DR. F. W. FREEMAN
Anderson, Ind.
DR. A. J. LARGE
Winona, Minn.
DR. J. J. LIVINGSTON
Little Rock, Ark.
DR. M. B. MEYER
Wilmington, Del.
DR. J. K. MORRIS
Erie, Penn.
DR. C. A. PERRIGO
Norfolk, Neb.
DR. D. E. PLAISTED
Lewiston, Me.
DR. H. N. SMITH
Sioux Falls, S. D.
DR. H. R. SPITLER
Eaton, Ohio
DR. A. P. WHEELOCK
Des Moines, Ia.

FROM THE RUBBISH HEAP

Has it ever occurred to you that the same manufacturers who are so anxious to "preserve the eyesight of the nation" by insisting that all optometrists prescribe and use the latest types of ophthalmic lenses are also responsible for flooding the country with glazed goods? These same manufacturers, and they are all equally to blame, have perfected lens designs and curvatures to a high point of excellence in an effort to conserve and to aid the vision of America, but they are also guilty of distributing, through the mail order and chain store houses, millions of pairs of the poorest quality glasses, knowing as they must that this trash will sooner or later find its way into the hands of some innocent user who through lack of either interest or education will probably ruin both his eyes and his nervous system, because of its use.

They tell us that there is a demand for cheap glazed goods which must be supplied. There is also a demand for cheap food stuffs and for cheap drugs. We wonder, for instance, if a large house say like Parke-Davis would send out a batch of milk of magnesia which was so rotten and impure that it might poison the user, just because some unprincipled wholesale drug supply house demanded a cheap and an inferior article? Or we wonder perhaps if one of the big packing companies in Chicago would dare send out a lot of decayed meat just because some butcher felt that he could doctor it up sufficiently to get it over to the unsuspecting public. Well, perhaps the packers might and in fact if the writer's memory serves him correctly, they did, and

this was one of the contributing factors necessitating constant government inspection and supervision at these same packing houses.

Must we come to government supervision of the optical industry to awaken these business executives who run these mammoth factories, to their responsibilities? While we as optometrists appreciate the splendid service their research departments are constantly giving our profession, we cannot for the moment shut our eyes to the fact that while visitors are shown through these laboratories and are shown the equipment used to make the best lenses on earth they nevertheless are not shown the junk pile from which is picked the material which goes into the making of glazed goods in these same factories.

Of course we realize that if there was no market for it, it would not be made. On the other hand, if it were not made the market would be satisfied with a far superior article. The fault, of course, is also partially Optometry's. In the latter part of the nineteenth century probably two-thirds of the glasses sold by optometrists were glazed at the factory and in this, Optometry today, is in a sense, a victim of its own ancestry. Even today some optometrists are guilty of handling glazed goods. One sees a window full of this trash alongside of a practitioner who is most painstaking in his work. These two types of optometry clash and the first must go! There is no room in our profession for a man who will so degrade his own work as to fit a pair of glazed goods spectacles and within a very few years there will be no room in America for distributors of optical rubbish of any kind whatsoever. If this thing cannot be accomplished within the industry itself because of the righteousness of the cause, it is time we appeal to Congress in Washington for a regulatory act forbidding the manufacturing and distributing of this trash within the confines of these United States. Such a law could easily be passed on the basis of public health, particularly so if it had the backing of every optometric society and of the A. O. A.

We believe ourselves to be an enlightened people, yet the junk that is being handed out by the chain stores and by the mail order houses would have led to prosecution by those original optical guilds back in the year of 1666. Yet today, amazing as it seems, manufacturer after manufacturer secretly floods the country with this stuff, pointing at the same time with pride to the wonderful advancement made in optical science by their laboratory technicians. Let us go after the optometrist who so violates his own professional code as to handle this stuff and let us also go after manufacturers who in the long run are hurting their own business by not consigning this third and fourth quality offal to the rubbish heap where it belongs and where it should be left.

C. C. K.

* * * * * *

ROCHESTER UNIVERSITY

On June 15th, Mr. Edward Bausch, President of the Bausch & Lomb Optical Company, received the honorary degree of Doc-

tor of Laws by the University of Rochester at its 81st annual convention exercises.

* * * * * *

MASS PRODUCTION REFRACTIONS

Someone is always attempting to systematize ocular examinations and to boil these down to the shortest possible number of minutes. In the minds of certain individuals the essential thing seems to be, not how well can this piece of work be done, but rather in how short a time can a given number of tests be made. In an optometric publication just received we note the following table:

1.	Taking visual acuity	Time occupied,	1	minute
2.	Muscle balance	" "	2	minutes
3.	Ophthalmoscope	" "	3	"
4.	Ophthalmometer	" "	3	"
5.	Retinoscope	" "	3	"
6.	Charts	" "	6	"
7.	Muscle balance	" "	2	"
	Total time occupied		20	minutes

Here indeed we find an example strictly laid out according to the most approved methods to which we Americans so fondly adhere. By following such a routine no doubt "mass-production refractions" could be turned out at the rate of from sixteen to twenty per day. Perhaps more. Whether or not the work would be satisfactory is of little moment. The time is the thing. Refractions should be made, not with a view of accomplishing something worth while but rather with one eye on the clock and the other on the cash register. Newer technics and post-refractions must never be considered as time is far too precious to enable these busy pseudo-refractionists to do any thinking except perhaps along the lines of super-sales psychology. "Prescribe two pair of glasses where only one was used before" is their motto, irrespective of the fact that in most cases both pairs are wrong. This is their ambition in life and thus do they undo much of the splendid work accomplished by those optometrists who are sincerely attempting to give each case the individual attention it requires.

C. C. K.

* * * * * *

INDIANA STATE MEETING

The Indiana State Association of Optometry held its midsummer meeting at the South Shore Inn, Lake Wawasee, Indiana, on June 28th, 29th and 30th inclusive. The Inn was reserved exclusively for the convention on the above dates. Mr. Ralph Barstow of Rochester, New York, the well-known economist and lecturer, spoke at the convention on the subject of "Optometric Economics."

ANNOUNCEMENT BY ATLANTIC UNIVERSITY

An announcement was recently made by Wm. Mosely Brown, Ph. D., President of the Atlantic University located at Virginia Beach, Virginia, that an optometry course will be offered at the university beginning with the fall session of 1931-1932. A limited number of students will be enrolled in the college of optometry. The curriculum calls for a four-year course and will lead to the degree of Doctor of Optometry.

* * * * * *

GRADUATE CLINIC FOUNDATION

The announcement has been made that there are now one hundred and nine study groups meeting throughout America under the guidance and direction of Dr. A. M. Skeffington of the Graduate Clinic Foundation. This is the largest number of study groups ever enrolled under a unified program and indicates the splendid interest which has been aroused among optometrists by the outstanding work accomplished by the director of the foundation. The American Journal of Optometry has received many notices relative to these study group meetings, most of which we have been unable to use because either for lack of space or because the notices were received too late to appear in this Journal before the meeting took place.

Dr. M. Marks of Rockford, Illinois, wishes to call attention to the monthly meetings of the Mississippi Valley Research Society; Dr. H. L. Bowers of Bay City, Michigan, wishes to call attention to the monthly meetings of the Saginaw Valley Zone, and Dr. E. E. Keller of Salt Lake City wishes to call attention to the Salt Lake Study Group. Optometrists in the vicinities mentioned should get in touch with these gentlemen for further particulars as to the meeting place and the date.

* * * * * *

MINNESOTA STATE BOARD OF OPTOMETRY

The Minnesota State Board of Optometry will conduct examinations on July 21st, 22nd and 23rd, 1931, in the Senate Chamber of the old State Capitol, St. Paul, Minnesota.

* * * * * *

BACK COPIES WANTED

Dr. W. W. Brown, President of the West Virginia State Association of Optometrists, is anxious to complete his file of the American Journal of Optometry and he wishes to secure a copy of the January, February and March issues of 1929. Dr. Brown is willing to purchase these copies and any optometrist who cares to dispose of them is requested to get in touch with Dr. Brown at the above address.

Also Dr. Edmund I. Wilson of 80 Boylston Street, Boston, Mass., wishes to secure a copy of the December, 1928, issue.

* * * * * *

(Continued on page X)

KEEP TO THE

THAT people are still demanding the best in the treatment of their eyes is attested by the fact that the sale of Bausch & Lomb Orthogon Lenses and Frames and Mountings for the first four months of 1931 are in excess of 1930 sales for the corresponding period.

RIGHT!

THROUGH the centuries the optical profession has slowly and laboriously climbed upward. Step by step it has progressed until it has reached its present plane of prestige and eminence in the professional world.

What lies ahead? Is there any easy short cut to success? Or can progress be made only by sticking to the hard upward climb?

Two roads lie stretched before us of the optical profession. One is the broad, easy road of retrogression—lower prices, lower qualities, lower ideals and a negation of all that is best in ethical practice. This road has only one direction—down, down, down, with no bottom.

The other road is a harder climb but its goal is certain. Only by adhering to standards of ever improving quality, higher prices if necessary, and the finest possible in service and merchandise, can we continue the upward climb and avoid the route that would lead back to the Middle Ages.

BAUSCH & LOMB OPTICAL CO.

ROCHESTER, - NEW YORK

Newest and Best Bifocal Lens

Panoptik

The Panoptik Bifocal as nearly as any artificial element can measure up to natural Efficiency provides the means for the widest possible range of effective vision for the Presbyope.

Send for Descriptive Circular

N. P. Benson Optical Co., Inc.

EXCLUSIVELY WHOLESALE

Minneapolis Duluth Aberdeen La Crosse Bismarck Eau Claire

(*Continued from page 251*)

* * * * * *

OPTOMETRIC EXTENSION PROGRAM

From the office of Dr. E. B. Alexander, Secretary of the Central Bureau of the Optometric Extension Program, comes the notice of fifteen educational meetings that were held during the month of June in Texas, Oklahoma, Mississippi and Arkansas. There were three speakers on the program for each meeting.

* * * * * *

A. O. A. MEETS IN SAN ANTONIO

All the officers of the American Optometric Association were re elected at the annual meeting of the A. O. A., held in San Antonio, Texas, from June 21st to 27th. The International Association of the Boards of Examiners in Optometry met prior to the meeting of the A. O. A.